

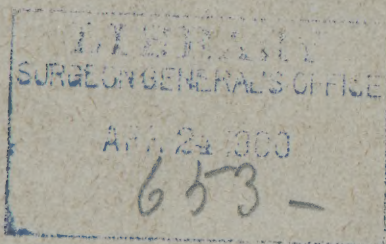
HIBBS (R.A.)

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*IN FIFTY CASES OF TUBERCULOUS  
DISEASE OF THE HIP JOINT.*

BY

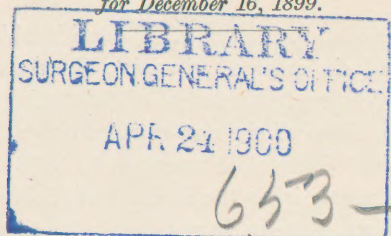
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A STUDY OF  
SHORTENING OF THE TIBIA AND FEMUR  
IN FIFTY CASES OF  
TUBERCULOUS DISEASE OF THE HIP JOINT.\*

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IN studying the question of the causes of shortening of the limb in connection with tuberculous disease at the hip, from the writings upon this subject, one receives the impression that the principal cause is considered to be the destruction of bone.

This is probably due to the fact that suppuration, a conspicuous evidence of the destruction of tissue, occurs so frequently, which, with the shortening of the tibia obscured by the usual method of measuring the limb from the anterior superior spine of the ilium to the internal malleolus, suggests that the femur is chiefly affected and that bone is destroyed. It does not follow necessarily, however, that suppuration is evidence of the destruction of bone, as in many cases in which it is profuse the destruction of bone is slight, while in others

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that have no suppuration it is considerable. Of one hundred and six cases of hip-joint disease reported by the writer, the greatest amount of shortening was found, as a rule, in those of the non-suppurative variety (*New York Medical Journal*, November 5, 1898). The importance of recognizing the amount of shortening of the tibia is obvious, since it, in not being due to the destruction of tissue, would serve to indicate to what extent shortening was due to other causes.

For the purposes of this discussion it would seem to simplify the matter to consider the causes of shortening of two varieties: First, the direct, that due to the destruction of tissue; second, the indirect, that due to a trophoneurotic affection which causes diminution in thickness as well as length of the bones and the interference with the growth of the limb by the impairment of function. The first of these causes would be effective only while the inflammatory process was active, and the same would probably be true of the second, so far as the trophoneurotic disturbances were concerned; but in the matter of interference with growth from impairment of function, this would continue effective so long as growth was possible and in proportion to the extent of such impairment, which will be greater or less, depending upon many considerations which it is not my purpose to discuss here, though in most cases there will result some impairment of function, as you will have observed. The fact that impairment of function and interference with growth incident to it will continue until growth has been attained renders the consideration of this cause in cases that have not attained their growth of less value, but the difficulties in reporting a large number of cases

that have attained their growth is obvious. The displacement of the head of the femur would have an important bearing upon the amount of shortening, but not being pertinent to this discussion it will not be considered, and no case has been included in this report in which it could be detected.

The fifty cases studied were observed in the New York Orthopædic Dispensary and Hospital, and are arranged in the accompanying table. Their treatment was by the traction method as applied by the long traction hip splint, and the greater part of the time as dispensary patients.

The measurement of the femur was taken from the anterior superior spine of the ilium to the line of articulation between the femur and the tibia on the inner side of the knee joint, and the tibia from this point to the internal malleolus. This I believe to be a more accurate method of measuring these bones than to use the tubercle of the tibia as a fixed point, though this also was done in most instances. I am indebted to Dr. E. J. Parish, the assistant resident surgeon of the hospital, for assisting me in measuring most of these cases.

In thirty-three cases, or sixty-six per cent., there was shortening of both the tibia and femur. In one the disease had existed less than one year, and there was a quarter of an inch shortening of the tibia and three quarters of an inch shortening of the femur. In eleven cases the disease had existed from two to four years, and the average shortening of the tibia was .23 of an inch; of the femur, .43 of an inch. In two of the latter the shortening of the tibia was greater than that of the femur, in two it was equal, and in the remaining seven the shortening of the femur was greatest.

Case No.	Sex.	Age.	Disease.	Duration of disease.	Suppura- tive.	Non-suppu- rative.	SHORTENING.			LENGTHENING.			Duration of treatment by traction.
							Tibia.	Femur.	Limb.	Tibia.	Femur.	Limb.	
1....	F.	10	L. H.	3½ years.	1	..	In. ½	In. ½	In.	In.	In. ½	In.	3 years.
2....	M.	10	R. H.	3½ years.	1	..	.. ½	.. ½	.. ½	..	..	..	3 years.
3....	F.	10	L. H.	6 years.	1	..	.. ½	.. ½	1	..	..	..	6 years.
4....	M.	13	L. H.	7 years.	1	..	.. ½	1½	1½	..	..	..	2 years.
5....	M.	14	L. H.	7 years.	1	..	.. ½	1½	2½	..	..	..	2 years.
6....	F.	11	L. H.	3½ years.	1	..	.. ½	..	..	..	..	.. ½	3 years.
7....	M.	8	R. H.	3½ years.	1	..	.. ½	..	..	..	..	.. ½	3 years.
8....	M.	12	R. H.	7 years.	1	..	.. ½	..	..	..	..	.. ½	3 years.
9....	M.	5	R. H.	2½ years.	1	..	.. ½	..	..	..	..	.. ½	6½ years.
10....	M.	4	L. H.	3½ years.	1	..	.. ½	..	.. ½	..	..	.. ½	2 years.
11....	M.	5	R. H.	2½ years.	1	..	.. ½	..	.. ½	..	..	.. ½	3 years.
12....	F.	5	R. H.	2 years.	1	..	.. ½	..	.. ½	..	..	.. ½	2 years.
13....	F.	9	R. H.	1½ years.	1	..	.. ½	..	.. ½	..	..	.. ½	2 years.
14....	M.	11	R. H.	2½ years.	1	..	.. ½	..	.. ½	..	..	.. ½	1 year.
15....	M.	6	R. H.	3½ years.	1	..	.. ½	..	.. ½	..	..	..	2 years.
16....	M.	8	L. H.	3 years.	1	..	.. ½	.. ½	.. ½	..	..	..	3 years.
17....	M.	6	R. H.	5 years.	1	..	.. ½	.. ½	.. ½	..	..	..	2 years.
18....	M.	9	R. H.	3 years.	1	..	.. ½	.. ½	1	..	..	..	4½ years.
19....	M.	14	R. H.	10 years.	1	..	.. ½	1½	2½	..	..	..	2½ years.
20....	F.	19	R. H.	7 years.	1	..	.. ½	1	1½	..	..	..	4 years.
21....	M.	5	L. H.	4 years.	1	..	.. ½	1	1½	..	..	..	5 years.
22....	F.	11	R. H.	3½ years.	1	..	.. ½	1	1½	..	..	..	3½ years.
23....	M.	17	R. H.	7 years.	1	..	.. ½	1½	2½	..	..	..	5½ years.
24....	F.	25	L. H.	12 years.	1	..	1	1½	2½	..	..	..	8 years.



25....	F. M.	16	R. H.	11 years.	1	..	1	2	2½	..	..	5 years.
26....	F. M.	11	L. H.	8 years.	1	..	1	1	2½	..	..	5 years.
27....	F. F.	10	L. H.	2 years.	..	1	1	..	2½	..	..	1½ year.
28....	F. F.	9	L. H.	1 years.	..	1	1	..	..	..	..	1 year.
29....	M. M.	10	L. H.	3½ years.	..	1	1	..	..	..	..	3 years.
30....	M. M.	5	R. H.	3½ years.	..	1	1	..	..	..	..	2½ years.
31....	M. M.	7	L. H.	3 years.	..	1	1	..	..	..	..	3 years.
32....	F. F.	10	R. H.	2½ years.	..	1	1	..	..	..	..	2 years.
33....	F. F.	12	R. H.	7 years.	..	1	1	..	..	..	..	5 years.
34....	F. F.	8	L. H.	3 years.	..	1	1	..	..	..	..	2 years.
35....	F. F.	13	L. H.	7 years.	..	1	1	..	..	..	..	5 years.
36....	M. M.	11	R. H.	14 years.	..	1	1	1	2½	..	..	6 years.
37....	M. M.	8	R. H.	6 years.	1	..	1	1	2½	..	..	6 years.
38....	F. F.	10	L. H.	7 years.	..	1	1	..	2½	..	..	4 years.
39....	M. M.	13	R. H.	11 years.	..	1	1	..	2½	..	..	6 months.
40....	F. F.	9	R. H.	3½ years.	..	1	1	..	1	..	..	8 years.
41....	M. M.	17	R. H.	7 years.	..	1	1	..	1½	..	..	6 years.
42....	F. F.	6	L. H.	3 years.	..	1	1	..	1	..	..	1½ year.
43....	M. M.	5	L. H.	3 years.	..	1	1	..	..	..	..	3 years.
44....	F. F.	16	R. H.	5 years.	1	..	1	..	..	..	..	5 years.
45....	M. M.	6	R. H.	8 months.	..	1	1	..	..	..	..	2 months.
46....	F. F.	4	L. H.	4 years.	1	..	1	..	1	..	..	3 years.
47....	F. F.	13	R. H.	5 years.	1	..	1	..	1	..	..	4 years.
48....	M. M.	5	L. H.	2½ years.	..	1	1	..	..	..	..	2 years.
49....	M. M.	10	L. H.	6 years.	..	1	1	..	..	..	..	5 years.
50....	M. M.	7	R. H.	4½ years.	..	1	1	..	..	..	..	4 years.

In four cases the disease had existed from four to six years and the average shortening of the tibia was .43 of an inch; of the femur, .47 of an inch; the shortening of the tibia being the greatest in one, the shortening equal in one, and the shortening of the femur greater in two. In eleven cases the disease had existed from six to eight years and the average shortening of the tibia was .54 of an inch; that of the femur, .94 of an inch. In one the shortening of the tibia was greater than that of the femur, in two the shortening was equal, and in eight the shortening of the femur was greatest.

In one case the disease had existed eight years, and the shortening of the tibia was an inch, and that of the femur, an inch and a quarter.

In the five remaining cases of this group the disease had existed from ten to fourteen years, and the average shortening of the tibia was .57, and that of the femur, 1.9 inch. This group presents the conditions that would be expected in most cases—shortening of both bones. Note that the greatest amount of shortening of the femur is found in those cases in which the duration of treatment by traction is shortest in comparison with the duration of the disease. Instance Case 36—the duration of the disease was fourteen years, while the duration of treatment by traction was six years; also Cases 25 and 19 are similar. Of course, these are the most conspicuous, but this will be found comparatively true of most of the cases. It is reasonable that such should be the case, as when traction is applied the effect of traumatism, an important element in increasing the activity of the disease, is minimized to the greatest degree.

There were two cases in which there was shortening



of neither bone (43 and 50) ; the disease had existed in the former three years, in the latter four years and a half. And in two cases there was shortening only of the femur (Cases 2 and 45) ; the disease having existed in the former three years and a half, in the latter only eight months.

It is difficult to explain the non-existence of shortening of the tibia in three of the last four cases mentioned. There might have been a congenital difference between the lengths of the tibiæ, the one of the diseased limb being the longer. In one instance the short duration (eight months) of the disease explains its absence.

In two cases, Nos. 10 and 13, there was shortening of the tibia only ; in the former the disease had existed three years and a half and in the latter a year and a third.

In the remaining eleven cases there was shortening of the tibia and lengthening of the femur. In four cases of this group, Nos. 1, 7, 14, and 27, in which the disease had existed, respectively, three years and a half, three years and a half, two years and a half, and two years, the lengthening of the femur was equal to the shortening of the tibia, thus showing the limbs of equal length ; while in the remaining seven cases the lengthening of the femur was greater than the shortening of the tibia, thus showing lengthening of the limb, the amount varying from an eighth to half an inch. The duration of the disease in six cases was from two to three years and a half, and in one case seven years.

Thus it may be seen from the conditions found in a group of cases how a measurement of the limb as a whole would give an incorrect impression of the effect of

the disease, and emphasizes the importance of measuring these bones separately. I have no doubt that many of the cases reported as having no shortening or even lengthening of the limb are such as these, and if measured in the same way would present a similar condition.

The cause of this undoubtedly is a congestion of the epiphysis of the femur which is due to the inflammatory action of the disease, when in proximity to it, increasing the activity of its growth.

A similar condition is often seen in the course of knee-joint disease where there is lengthening of either or both bones. An increased activity of the growth of the femur at this point may be sufficient to prevent shortening of the limb, or even produce lengthening for a time in the course of the disease, as was true in these cases; in one the disease had existed seven years (Case 8); but it is doubtful if this activity of growth will be sufficient to counterbalance the more constant causes of shortening and prevent their appearing ultimately some shortening of the limb. Measurements taken of the case just mentioned (No. 8) eighteen months previous showed three quarters of an inch lengthening of the limb, while now there is only an eighth of an inch lengthening. This patient will unquestionably have a certain amount of shortening when he has attained his growth.

The important relation that exists between function and nutrition, and the well-known fact that shortening increases somewhat after the disease has become inactive, suggest the probability that this increase will continue as long as growth is possible. As the less active growth of the diseased limb is due to impaired

function, a condition found as a result of this disease in most instances and one which is, as a rule, permanent, the increase of shortening will be proportionate to such impairment and to the years of growth to be attained.

I do not take the position that patients with tuberculous disease at the hip have not recovered with limbs of equal length after growth has been attained; but I think they are exceedingly rare, and are only such as have recovered from the disease very early in childhood, the treatment having been of short duration, with the normal function of the joint restored.

While shortening of both the tibia and femur is present in the large percentage of these cases, it would seem desirable, in order to arrive at some general conclusion as to the proportionate responsibility of these bones for the shortening of the limb, which would represent as truly the ultimate condition as possible, to consider only those cases in which the disease had existed longest, which are as well those nearest the end of the period of growth. There are thirteen such cases, the disease having existed from seven to fourteen years, their ages varying from ten to twenty-five years. The average shortening of the tibia was .70 of an inch, while that of the femur was 1.47 inch, thus showing the shortening of the femur about twice as great as that of the tibia. Whether this proportion will exist at a future period in the history of these cases it is impossible to say, though it is probable it will, in view of their age, the duration of the disease, and the inactivity of the disease in most instances. I would emphasize the importance of this fact, however, namely, that the knowledge of this proportion, whatever it may



be in any case, furnishes a means by which a fairly correct estimate may be placed upon the causes of shortening as to their comparative responsibility for it. It is obvious that the destruction of tissue can play no part in the cause of shortening of the tibia, though one half of



FIG. 1.—Case 5. Right tibia and fibula.



FIG. 2.—Case 5. Left tibia and fibula (diseased hip).

the entire shortening of the limb is represented by that bone in these cases. If the indirect causes of shortening, the trophoneurotic affection caused by this disease, and the interference with growth by impairment of function, produce this effect upon the tibia, it is fair to

assume that the femur will also be affected in this way to as great a degree, which fact suggests that destruction of tissue, the direct cause of shortening, is of less importance than the indirect causes, probably producing not more than one third of the total amount.

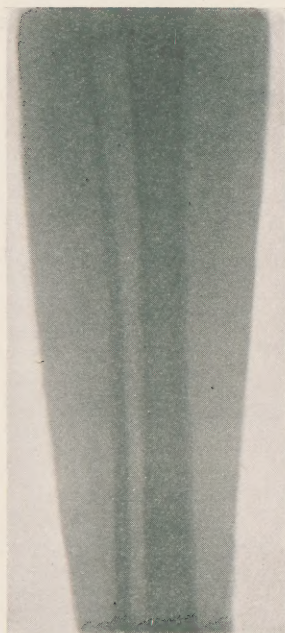


FIG. 3.—Case 38. Tibia and fibula of limb of diseased hip (left).



FIG. 4.—Case 38. Tibia and fibula of healthy limb (right).

In all of these cases in which the disease had existed any considerable length of time the foot of the affected limb was smaller. That the diminution in the thickness of the tibia might be appreciated, radiographs of the tibiæ were made in many instances, those of two

cases only accompanying this report, being sufficient to illustrate what was true of all that were examined in this way. These cases are Nos. 5 and 38, the disease having existed seven years in both instances. It is probable that radiographs will show diminution in the thickness of this bone as well as that of the femur earlier than shortening can be detected by measurements.



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